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DRINKING WATER SURVEILLANCE PROGRAM

**ST. THOMAS (ELGIN)
WATER SUPPLY
SYSTEM**

REPORT FOR 1991 AND 1992

ISSN 0840-5255

**ST. THOMAS (ELGIN) WATER SUPPLY SYSTEM
DRINKING WATER SURVEILLANCE PROGRAM
REPORT FOR 1991 AND 1992**

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

ST THOMAS (ELGIN) WATER SUPPLY SYSTEM 1991 AND 1992 REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

The St. Thomas (Elgin) water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. Powder activated carbon is added for taste and odour control. This plant has a rated capacity of $45.4 \times 1000 \text{ m}^3/\text{day}$. The St Thomas (Elgin) water supply system serves a population of approximately 54,200.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

Table A. is a summary of all results by group.

No known health related guidelines were exceeded.

The St. Thomas (Elgin) water supply system, for the sample years of 1991 and 1992, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A " " INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE	RAW TESTS	POSITIVE	%POSITIVE	TREATED TESTS	POSITIVE	%POSITIVE	R R 1 UNION TESTS	POSITIVE	%POSITIVE	RAVEN AVE TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL		27	16	59	9	0	0	6	0	0	10	1	10
CHEMISTRY (FIELD)		30	30	100	60	60	100	72	72	100	120	115	95
CHEMISTRY (LABORATORY)		236	209	88	240	180	75	252	217	86	420	362	86
METALS		240	100	41	240	66	27	276	88	31	460	175	38
CHLORODAROMATICS		84	0	0	98	0	0	56	0	0	112	0	0
CHLOROPHENOLS		6	1	16	0	0	0	0	0	0	0	0	0
PESTICIDES AND PCB		236	0	0	245	0	0	90	0	0	177	0	0
PHENOLICS		10	0	0	10	0	0	0	0	0	0	0	0
POLYAROMATIC HYDROCARBONS		65	0	0	65	0	0	48	0	0	65	0	0
SPECIFIC PESTICIDES		28	0	0	1	0	0	2	0	0	2	0	0
VOLATILES		296	0	0	296	40	13	174	24	13	296	40	13
RADIONUCLIDES		28	5	17	28	6	21	0	0	0	0	0	0
TOTAL		1,286	361		1,292	352		976	401		1,662	693	

DRINKING WATER SURVEILLANCE PROGRAM

ST THOMAS (ELGIN) WATER SUPPLY SYSTEM 1991 AND 1992 REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the St. Thomas water supply system in the spring of 1987. Previous annual reports have been published for 1987, 1988, 1989 and 1990.

PLANT DESCRIPTION

The St. Thomas (Elgin) water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation, filtration, fluoridation and disinfection. Powder activated carbon is added for taste and odour control. This plant has a rated capacity of 45.4 x 1000 m³/day. The St Thomas (Elgin) water supply system serves a population of approximately 54,200.

The sample day flows were recorded as 23.1 x 1000 m³/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Stringent DWSP sampling protocols were followed to ensure that all samples were collected in a uniform manner (see Appendix B).

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration.

Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

To obtain a representative raw water sample, free from any added chemicals, at plants which used chlorine for zebra mussel control, the operator was required to turn off the chlorine feed to the mouth of the intake and allow enough time for the chlorinated water to clear from the intake works.

Plant operating personnel routinely analyzed parameters for process control (Table 2).

At all distribution system locations, two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples, therefore, were laboratory chemistry and metals. The free flow sample represented fresh water from the distribution system main, since the sample tap was flushed for five minutes prior to sampling.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between the raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary of all results by parameter and by water type. If a parameter was not detected, the total number of negative

sample results is given. In contrast, if a parameter was detected at any location, the detailed results for all samples are provided.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment and Energy laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 4 and 5. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOS). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

The guidelines are evaluated on the results from the free flowing samples. Standing samples in the distribution system can show elevated concentrations in certain metals if the water is corrosive or if the standing time is excessive. Flushing the tap until the water achieves the coolest temperature will ensure that the water used for consumption will contain minimum concentrations of metals.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- THE TREATED AND DISTRIBUTED WATER;
- ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE
GUIDELINE VALUES; AND
- POSITIVE ORGANIC PARAMETERS DETECTED.

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of delivered water may increase in the distribution system due to the warming effect of soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Aesthetic Objective of 15°C in 11 of 26 treated and distributed water samples with a maximum reported value of 22.0°C.

CHEMISTRY (LABORATORY)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Recommended Operational Guideline of 80-100 mg/L in all 26 treated and distributed water samples with a maximum reported value of 135.7 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to measure the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant to avoid problems in the distribution system.

Aluminum exceeded the ODWO Recommended Operational Guideline of 100 ug/L in 6 of 26 treated and distributed water samples with a maximum reported value of 160.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

PESTICIDES AND PCB

The results of the pesticide and PCB scan showed that none were detected above trace levels.

PHENOLICS

The results of the phenol test showed that none were detected above trace levels.

POLYAROMATIC HYDROCARBONS

The results of the polyaromatic hydrocarbon scan showed that none were detected.

SPECIFIC PESTICIDES

The results of the specific pesticide scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology. Trace levels of styrene are considered to be laboratory artifacts resulting from the sample shipping containers.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THM results are discussed. Starting in 1991, samples from the distribution system were quenched with sodium thiosulphate to stop the further production of THMs in the sample bottle. This provided a more representative estimation of the THMs consumed in tap water.

Total trihalomethanes were found at positive levels in all 26 treated and distributed water samples analyzed with a maximum level of 44.3 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

RADIOLOGICAL

RADIONUCLIDES

There are more than 200 radionuclides, some of which occur naturally and others which originate from the activities of society. The radionuclides currently of greater interest from a

health view-point are tritium, strontium-90, iodine-131, cesium-137 and radium-226. The gross beta and gross alpha determinations are suitable for preliminary screening except for tritium which must be measured separately. Radionuclides are measured in becquerels per litre (Bq/L). No results were above the available guidelines.

CONCLUSIONS

No known health related guidelines were exceeded.

The St. Thomas (Elgin) water supply system, for the sample years of 1991 and 1992, produced good quality water and this was maintained in the distribution system.

FIGURE 1

ST THOMAS (ELGIN) WATER TREATMENT PLANT

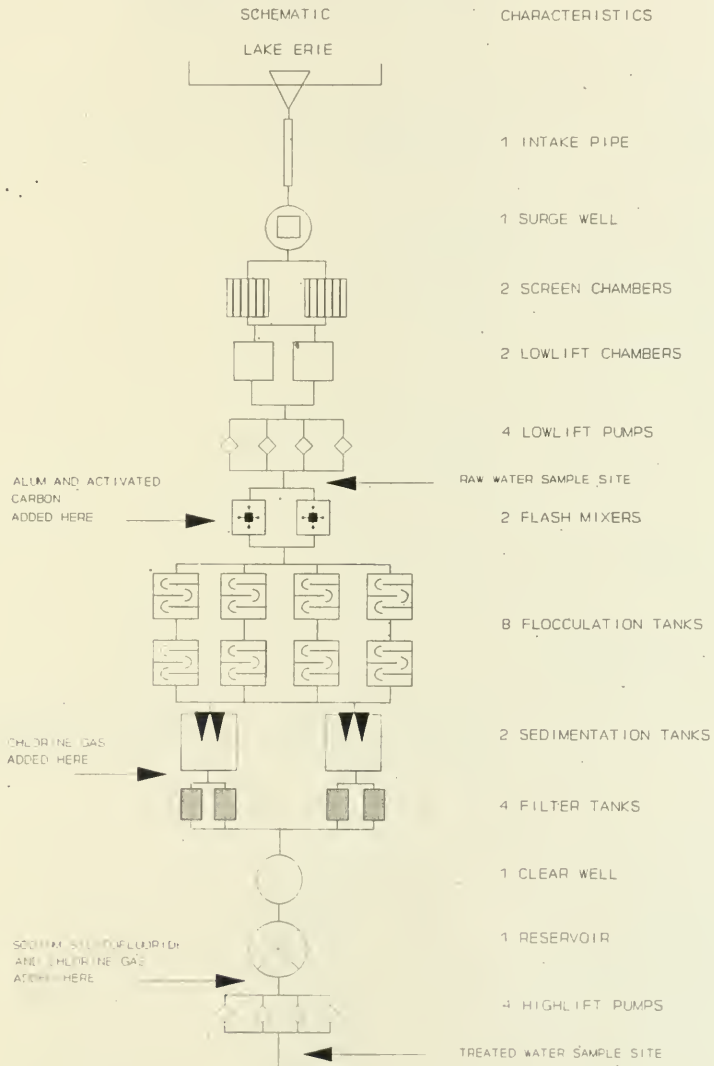


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

PLANT NAME: ST THOMAS (ELGIN) WSS
WORKS #: 210000871
UTM #: 174867854721230

DISTRICT: LONDON
REGION: SOUTHWEST
DISTRICT OFFICER: C. MURRAY

SUPERINTENDENT: MR. R. POWER

ADDRESS: COUNTY RD. 24
ST THOMAS, ONTARIO
N5P 3V6
519-782-3101

MUNICIPALITY: ST THOMAS
AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	24.190	(X 1000 M3)
DESIGN CAPACITY:	90.800	(X 1000 M3/DAY)
RATED CAPACITY:	45.400	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
BAYHAM TWP	3,922
FORD MOTOR CO.	N/A
MALAHIDE TWP	5,257
PT BRUCE VILLAGE	421
PT. BURIVELL VILLAGE	681
SOUTHWOLD TWP	4,342
ST THOMAS	31,350
VIENNA VILLAGE	282
YARMOUTH TWP	7,927

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER -----	LOCATION -----	FREQUENCY -----
ALUMINUM	LAB TREATED	WEEKLY
FREE CHLORINE RESIDUAL	LAB TREATED	DAILY
TOTAL CHLORINE RESIDUAL	LAB TREATED	EVERY 4 HOURS
FLUORIDE	LAB TREATED	DAILY
PH	LAB TREATED	DAILY
TEMPERATURE	LAB TREATED	DAILY
TURBIDITY	LAB TREATED RAW	EVERY 4 HOURS CONTINUOUS

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM ST THOMAS (ELGIN) WSS SAMPLE DAY CONDITIONS
AND TREATMENT CHEMICAL DOSAGES FOR 1991 AND 1992

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	COAGULATION POLYALUMINUM SILICATE SULPHATE	TASTE AND ODOR ACTIVATED CARBON POWDER	PRE CHLORINATION CHLORINE	POST CHLORINATION CHLORINE	FLUORIDATION SODIUM SILICOFLOURIDE
91 JAN 08 10.17	23.185	20.00		2.60	1.29	.26	1.20
91 MAR 05 10.17	23.185	10.00		2.10	1.19	.23	1.10
91 MAY 07 10.17	23.185	13.50		2.90	1.45	.30	1.10
91 JUL 03 10.17	23.185	20.00		1.10	1.40	.24	1.21
91 SEP 04 10.17	23.185	6.00		1.60	2.00	.22	1.00
91 NOV 05 10.17	23.185	8.60		3.10	1.10	.35	1.10
92 JAN 07 10.17	23.185	2.80		2.90	1.08	.23	1.10
92 APR 07 10.17	23.185	15.00		1.50	1.20	.20	1.10
92 JUL 07 10.17	23.185	5.50		1.60	1.15	.34	1.10
92 OCT 06 10.17	23.185	11.50		3.00	1.10	.35	1.10

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

KEY TO TABLE 4 and 5

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline
5. Health Related Guidance Value
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

. No Sample Taken

BDL Below Minimum Measurement Amount

<T Greater Than Detection Limit But Not Confident
(SEE INTERPRETATION OF RESULTS ABOVE)

> Results Are Greater Than The Upper Limit

<=> Approximate Result

!48 No Data: Sample Age Exceeded 48 Hours

!AR No Data: No Numeric Results

!AW No Data: Analysis Withdrawn

!BT No Data: Sample Broken In Transit

!CS No Data: Contamination Suspected

!EF No Data: Laboratory Equipment Failure

!IR No Data: Insufficient Sample

!IS No Data: Insufficient Sample

!LA No Data: Laboratory Accident

!NP No Data: No Procedure

!NR No Data: Sample Not Received

!OP No Data: Obscured Plate

!PE No Data: Procedure Error: Sample Discarded

!PR No Data: Preservative Required

!QU No Data: Quality Control Unacceptable

!RE No Data: Received Empty

!RO No Data: No Numeric Results

!SM No Data: Sample Missing

!SS No Data: Sample Improperly Preserved

!U No Data: Sample Unsuitable For Analysis

!UB No Data: Bottle Broken

!UN No Data: Result Unreliable

!UR	No Data: Unpreserved Sample Required
A	Approximate Value
A3C	Approximate, Total Count Exceeded 300 Colonies
A>	Approximate Value, Exceeded Normal Range
APS	Additional Peak, Less Than, Not Priority Pollutant
ARO	Additional Information In Laboratory Report
CRO	Calculated Result Only
NAF	Not All Required Tests Found
RID	Ioncal Calculated on Incomplete Data Set
RMP	P and M-Xylene Not Separated
RRR	Result Obtained by Repeat Analysis
RRV	Rerun Verification
SFA	Sample Filtered: Filtrate Analyzed
SIL	Sample Incorrectly Labelled
SPS	Several Peaks, Small, Not Priority Pollutant
U48	Unreliable: Sample Age Exceeded 48 Hours
UAL	Unreliable: Sample Age Exceeded Limit
UAU	Unreliable: Sample Age Unknown
UCS	Unreliable: Contamination Suspected
WSD	Wrong Sample Description On Bottle

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
BACTERIOLOGICAL					
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)	
1991 JAN	28	.	.	.	.
1991 MAR	BDL	.	.	.	.
1991 MAY	BDL	.	.	.	.
1991 JUL	BDL	.	.	.	.
1991 SEP	8	.	.	.	.
1992 JAN	2	.	.	.	.
1992 APR	BDL	.	.	.	.
1992 JUL	1	.	.	.	.
1992 OCT	8	.	.	.	.
STANDARD PLATE CNT MF (CT/ML)					
		DET'N LIMIT = 0		GUIDELINE = 500 (A3)	
1991 JAN	.	1 <=>	2 <=>	.	0 <=>
1991 MAR	.	2 <=>	2 <=>	.	0 <=>
1991 MAY	.	2 <=>	0 <=>	.	1 <=>
1991 JUL	.	2 <=>	2 <=>	.	1 <=>
1991 SEP	.	2 <=>	0 <=>	12	.
1991 NOV	.	.	0 <=>	.	0 <=>
1992 JAN	.	1 <=>	.	.	1 <=>
1992 APR	.	1 <=>	.	.	0 <=>
1992 JUL	.	4 <=>	.	.	1 <=>
1992 OCT	.	2 <=>	.	.	3 <=>
TOTAL COLIFORM MF (CT/100ML)					
		DET'N LIMIT = 0		GUIDELINE = 5/100ML (A1)	
1991 JAN	6100 A3C	.	.	.	.
1991 MAR	160 <=>	.	.	.	.
1991 MAY	50 <=>	.	.	.	.
1991 JUL	BDL	.	.	.	.
1991 SEP	BDL	.	.	.	.
1992 JAN	BDL	.	.	.	.
1992 APR	320 A3C	.	.	.	.
1992 JUL	BDL	.	.	.	.
1992 OCT	30 <=>	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)					
		DET'N LIMIT = 0		GUIDELINE = N/A	
1991 JAN	50000 A3C	.	.	.	.
1991 MAR	940	.	.	.	.
1991 MAY	1070	.	.	.	.
1991 JUL	6400 A3C	.	.	.	.
1991 SEP	10000 A3C	.	.	.	.
1992 JAN	3800 A3C	.	.	.	.
1992 APR	4000 A3C	.	.	.	.
1992 JUL	4600 A3C	.	.	.	.
1992 OCT	12000 A3C	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHEMISTRY (FIELD)					
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A	
1991 JAN	.150	.050	.100	.100	.050
1991 MAR	.150	.050	.100	.100	.100
1991 MAY	.100	.100	.100	.100	.050
1991 JUL	.320	.050	.100	.100	.100
1991 SEP	.300	.100	.200	.100	.100
1991 NOV	.400	.150	.300	.100	.100
1992 JAN	.200	.	.	.100	.150
1992 APR	.150	.	.	.100	.050
1992 JUL	.150	.	.	.100	.100
1992 OCT	.200	.	.	.100	.100
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A	
1991 JAN	.600	.800	.500	.250	.200
1991 MAR	.650	.800	.500	.250	.150
1991 MAY	.600	.800	.600	.250	.100
1991 JUL	.660	.750	.600	.100	.050
1991 SEP	.900	.800	.500	.050	.000
1991 NOV	.550	.750	.500	.050	.000
1992 JAN	.700	.	.	.150	.000
1992 APR	.650	.	.	.150	.100
1992 JUL	.850	.	.	.100	.000
1992 OCT	.900	.	.	.100	.000
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A	
1991 JAN	.750	.850	.600	.350	.250
1991 MAR	.800	.850	.700	.350	.250
1991 MAY	.800	.900	.700	.350	.150
1991 JUL	.980	.800	.700	.200	.150
1991 SEP	1.200	.900	.700	.150	.100
1991 NOV	.950	.900	.800	.150	.100
1992 JAN	.800	.	.	.250	.150
1992 APR	.800	.	.	.250	.150
1992 JUL	1.000	.	.	.200	.100
1992 OCT	1.100	.	.	.200	.100

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS.

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHEMISTRY (FIELD)					
FLD PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)	
1991 JAN	7.800	7.350	7.300	7.300	7.300
1991 MAR	7.800	7.300	7.300	7.300	7.300
1991 MAY	7.800	7.500	7.500	7.300	7.300
1991 JUL	7.600	7.300	7.100	7.300	7.300
1991 SEP	7.400	7.100	7.250	7.200	7.200
1991 NOV	7.600	7.300	7.400	7.250	7.300
1992 JAN	7.400	7.200	*	7.400	7.400
1992 APR	7.700	7.200	*	7.300	7.500
1992 JUL	7.600	7.200	*	7.350	7.400
1992 OCT	7.800	7.300	*	7.300	7.400
FLD TEMPERATURE (DEG.C)					
		DET'N LIMIT = N/A		GUIDELINE = 15 (A3)	
1991 JAN	1.000	.500	14.000	7.000	15.000
1991 MAR	1.000	1.000	12.500	5.500	19.000
1991 MAY	12.500	10.000	13.500	10.500	23.000
1991 JUL	20.000	18.000	17.000	17.500	22.000
1991 SEP	20.000	22.000	18.000	20.000	21.000
1991 NOV	9.000	11.000	15.500	15.500	21.000
1992 JAN	2.000	2.000	*	8.000	21.500
1992 APR	3.000	3.000	*	6.000	21.000
1992 JUL	17.000	17.000	*	16.500	21.000
1992 OCT	18.000	18.000	*	18.500	18.000
FLD TURBIDITY (FTU)					
		DET'N LIMIT = N/A		GUIDELINE = 1.0 (A1)	
1991 JAN	83.000	.120	.110	.160	.150
1991 MAR	11.000	.110	.180	.130	.120
1991 MAY	96.000	.110	.110	.100	.090
1991 JUL	8.500	.130	.150	.150	.110
1991 SEP	8.900	.080	.140	.130	.130
1991 NOV	102.000	.120	.110	.090	.100
1992 JAN	9.800	.100	*	.130	.130
1992 APR	40.000	.480	*	.100	.110
1992 JUL	4.100	.090	*	.070	.070
1992 OCT	23.700	.090	*	.090	.090

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHEMISTRY (LABORATORY)					
ALKALINITY (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A4)	
1991 JAN	105.700	92.500	91.500	89.900	91.700
1991 MAR	97.300	88.600	88.100	88.900	89.100
1991 MAY	99.200	90.700	90.900	90.500	90.500
1991 JUL	97.300	90.200	90.400	90.200	92.600
1991 SEP	98.300	91.600	92.200	92.100	96.200
1991 NOV	96.900	90.600	89.200	89.100	91.300
1992 JAN	90.100	83.600	.	.	85.400
1992 APR	100.700	91.400	.	89.300	89.200
1992 JUL	95.500	89.300	.	90.000	90.800
1992 OCT	93.300	86.700	.	88.000	87.700
CALCIUM (MG/L)		DET'N LIMIT = 0.20		GUIDELINE = 100 (F2)	
1991 JAN	39.100	39.300	39.600	39.000	39.900
1991 MAR	36.800	36.600	36.600	37.000	36.600
1991 MAY	34.700	35.800	37.400	35.100	36.600
1991 JUL	35.200	34.600	36.000	34.800	37.000
1991 SEP	37.100	36.400	37.100	37.100	37.600
1991 NOV	34.100	35.800	35.300	35.500	35.000
1992 JAN	31.100	30.700	.	.	32.600
1992 APR	36.100	35.800	.	.	34.900
1992 JUL	33.800	34.200	.	.	34.500
1992 OCT	33.050	34.200	.	35.650	35.650
CYANIDE (MG/L)		DET'N LIMIT = 0.001		GUIDELINE = 0.2 (A1)	
16 SAMPLES	BDL	BDL	.	.	.
CHLORIDE (MG/L)		DET'N LIMIT = 0.20		GUIDELINE = 250 (A3)	
1991 JAN	14.900	15.500	15.300	15.300	15.100
1991 MAR	14.200	15.300	15.400	15.300	15.200
1991 MAY	14.400	15.200	15.200	15.300	15.500
1991 JUL	14.600	16.400	16.300	16.500	16.500
1991 SEP	15.200	17.000	17.100	17.000	17.000
1991 NOV	15.400	16.300	16.200	16.300	16.700
1992 JAN	13.200	14.000	.	.	14.400
1992 APR	16.100	16.400	.	.	16.200
1992 JUL	14.700	16.000	.	.	16.200
1992 OCT	14.300	15.400	.	15.700	15.700

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHEMISTRY (LABORATORY)					
COLOUR (H2U)		DET'N LIMIT = 0.50		GUIDELINE = 5 (A3)	
1991 JAN	BOL	-500 <T	-500 <T	-500 <T	1,000 <T
1991 MAR	BOL	BOL	-500 <T	BOL	500 <T
1991 MAY	5,500	-500 <T	-500 <T	-500 <T	1,000 <T
1991 JUL	BOL	-500 <T	-500 <T	-500 <T	500 <T
1991 SEP	BOL	-500 <T	-500 <T	-500 <T	1,000 <T
1991 NOV	BOL	-500 <T	-500 <T	-500 <T	1,000 <T
1992 JAN	2,500	-500 <T	-500 <T	-500 <T	1,000 <T
1992 APR	3,500	-500 <T	-500 <T	-500 <T	1,000 <T
1992 JUL	BOL	-500 <T	-500 <T	-500 <T	1,000 <T
1992 OCT	BOL	-500 <T	-500 <T	-500 <T	3,000
CONDUCTIVITY (UMHO/CM)					
		DET'N LIMIT = 1.0		GUIDELINE = 400 (F2)	
1991 JAN	283	300	293	295	295
1991 MAR	277	283	250	283	283
1991 MAY	267	278	275	276	276
1991 JUL	279	284	285	288	289
1991 SEP	277	284	284	291	291
1991 NOV	278	292	293	295	294
1992 JAN	257	284	-	270	270
1992 APR	285	292	-	285	285
1992 JUL	279	285	-	286	286
1992 OCT	268	280	-	286	285
DISS ORG CARBON (MG/L)					
		DET'N LIMIT = 0.10		GUIDELINE = 5.0 (A3)	
1991 JAN	2,200	1,600	1,800	1,900	1,800
1991 MAR	1,800	1,600	1,800	1,500	1,700
1991 MAY	1,700	1,500	1,600	1,700	1,600
1991 JUL	1,700	1,600	1,600	1,600	1,600
1991 SEP	2,000	1,800	1,900	1,900	1,800
1991 NOV	1,800	1,500	1,600	1,500	1,600
1992 JAN	1,700	1,400	-	1,400	1,400
1992 APR	1,700	1,800	-	1,500	1,500
1992 JUL	1,600	1,500	-	1,500	1,500
1992 OCT	1,800	1,500	-	1,700	1,800

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHEMISTRY (LABORATORY)					
FLUORIDE (MG/L)		DET'N LIMIT = 0.01			
		GUIDELINE = 1.5 (A1)			
1991 JAN	.140	1.200	1.220	.880	.900
1991 MAR	.120	1.180	1.000	1.140	1.180
1991 MAY	.120	1.120	1.000	1.020	1.120
1991 JUL	.100	1.140	1.100	1.160	1.180
1991 SEP	.160	.920	1.140	1.260	1.240
1991 NOV	.120	1.220	1.140	1.020	1.040
1992 JAN	.120	1.160	-	1.180	1.240
1992 APR	.100	1.180	-	1.100	1.160
1992 JUL	.120	1.100	-	1.140	1.140
1992 OCT	.120	1.080	-	1.220	1.200
HARDNESS (MG/L)					
		DET'N LIMIT = 0.5			
		GUIDELINE = 80-100 (A4)			
1991 JAN	136.000	134.600	133.900	134.500	135.200
1991 MAR	127.000	127.000	128.000	128.000	127.000
1991 MAY	121.900	123.900	127.700	126.000	125.700
1991 JUL	123.000	124.000	124.000	128.000	129.000
1991 SEP	129.800	127.500	128.700	131.100	130.200
1991 NOV	121.900	127.000	124.000	124.300	123.100
1992 JAN	111.400	111.200	-	118.700	115.800
1992 APR	128.000	127.000	-	123.000	124.000
1992 JUL	120.000	121.000	-	121.000	122.000
1992 OCT	118.310	121.160	-	124.420	124.950
IONCAL (DMS/LESS)					
		DET'N LIMIT = N/A			
		GUIDELINE = N/A			
1991 JAN	3.065	4.461	5.267	4.672	4.465
1991 MAR	4.288 RID	5.671 RID	5.636 RID	6.009 RID	5.371 RID
1991 MAY	2.671	1.141	1.308	4.056	4.542
1991 JUL	.165	2.316	1.327	2.832	4.494
1991 SEP	4.423	4.320	4.597	4.879	2.661
1991 NOV	.698 NAF	1.600 NAF	.167	.778	1.622
1992 JAN	1.814	1.180	-	3.300	.257
1992 APR	.199	1.250	-	1.345	1.678
1992 JUL	1.125	.893	-	.075	.271
1992 OCT	.044	2.539	-	2.211	2.987

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R T UNION FREE FLOW	DIST. SYSTEM R R T UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHEMISTRY (LABORATORY)					
POTASSIUM (MG/L)		DET'N LIMIT = 0.01		GUIDELINE = 10 (F2)	
1991 JAN	2.480	1.420	1.470	1.350	1.420
1991 MAR	1.450	1.400	1.400	1.400	1.400
1991 MAY	1.410	1.360	1.350	1.330	1.280
1991 JUL	1.200	1.250	1.300	1.400	1.450
1991 SEP	1.510	1.450	1.430	1.480	1.440
1991 NOV	1.510	1.340	1.380	1.360	1.380
1992 JAN	1.200	1.150			1.220
1992 APR	2.040	1.480		1.440	1.470
1992 JUL	1.440	1.410		1.480	1.460
1992 OCT	1.453	1.383		1.399	1.431
LANGLIERS INDEX (OMNILESS)					
		DET'N LIMIT = N/A		GUIDELINE = N/A	
1991 JAN	.424	.261	.200	.259	.316
1991 MAR	.424 RID	.278 RID	.266 RID	.328 RID	.301 RID
1991 MAY	.351	.211	.242	.133	.230
1991 JUL	.434	.141	.189	.174	.200
1991 SEP	.392	.240	.182	.231	.223
1991 NOV	.269	.225	.122	.124	.218
1992 JAN	.275	.204			.287
1992 APR	.467	.349			.370
1992 JUL	.388	.292			.352
1992 OCT	.282	.041			.132
MAGNESIUM (MG/L)					
		DET'N LIMIT = 0.1		GUIDELINE = 30.0 (F2)	
1991 JAN	9.350	8.850	8.950	8.850	8.600
1991 MAR	8.700	8.700	8.700	8.750	8.600
1991 MAY	8.550	8.350	8.350	8.500	8.300
1991 JUL	8.600	9.200	9.100	9.100	9.000
1991 SEP	9.000	8.900	8.850	8.800	8.800
1991 NOV	8.950	9.150	8.650	8.550	8.650
1992 JAN	8.200	8.350			8.350
1992 APR	9.290	9.060			8.940
1992 JUL	8.700	8.700			8.650
1992 OCT	8.700	8.700		8.600	8.730

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING	CHEMISTRY (LABORATORY)	
						SODIUM (MG/L)	AMMONIUM TOTAL (MG/L)
GUIDELINE = 200 (A4)							
1991 JAN	8.100	8.700	8.600	8.500	8.500	8.300	
1991 MAR	8.400	8.800	8.800	8.800	8.600	8.600	
1991 MAY	7.800	8.300	8.100	8.200	8.600	9.200	
1991 JUL	8.000	8.400	7.800	7.600	7.800	8.200	
1991 SEP	8.900	9.400	9.100	9.200	9.000	9.200	
1991 NOV	8.900	9.300	8.600	8.700	8.700	8.700	
1992 JAN	7.700	8.100	.	.	8.400	8.000	
1992 APR	8.810	9.100	.	.	8.810	8.940	
1992 JUL	8.340	8.770	.	.	8.770	8.850	
1992 OCT	8.330	8.870	.	.	8.940	8.980	
GUIDELINE = 0.05 (F2)							
1991 JAN	.004 <T	.010	.012	.010	.010	.008 <T	
1991 MAR	BOL	BOL	BOL	.002 <T	.004 <T	.002 <T	
1991 MAY	.002 <T	.006 <T	.006 <T	.006 <T	.004 <T	.010	
1991 JUL	.006 <T	.006 <T	.004 <T	.008 <T	.002 <T	.010	
1991 SEP	.010	.002 <T	BOL	.002 <T	.002 <T	.004 <T	
1991 NOV	BOL	.002 <T	.002 <T	.002 <T	.004 <T	.006 <T	
1992 JAN	.002 <T	.002 <T	.002 <T	.	.004 <T	BOL	
1992 APR	.002 <T	.006 <T	.	.	BOL	.008 <T	
1992 JUL	.004 <T	.002 <T	.	.	.004 <T	.004 <T	
1992 OCT	.002 <T	.004 <T	.	.	.004 <T	.008 <T	
GUIDELINE = 1.0 (A1)							
1991 JAN	.015	.001 <T	.001 <T	.001 <T	.001 <T	.001 <T	
1991 MAR	.004 <T	BOL	BOL	BOL	BOL	.001 <T	
1991 MAY	.008	.001 <T	.001 <T	BOL	BOL	.001 <T	
1991 JUL	.004 <T	BOL	BOL	BOL	BOL	.001 <T	
1991 SEP	.010	BOL	BOL	BOL	BOL	.001 <T	
1991 NOV	.007	.001 <T	BOL	BOL	BOL	.001 <T	
1992 JAN	.004 <T	.001 <T	.	.002 <T	.002 <T	.002 <T	
1992 APR	.014	.003 <T	.	.001 <T	.001 <T	.006	
1992 JUL	.005	BOL	.	.001 <T	.001 <T	.001 <T	
1992 OCT	.005	BOL	.	.001 <T	.001 <T	.002 <T	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHEMISTRY (LABORATORY)					
NITRATE (TOTAL) (MG/L)		DET'N LIMIT = 0.005		GUIDELINE = 10.0 (A1)	
1991 JAN	.450	.415	.400	.310	.295
1991 MAR	.435	.440	.435	.300	.440
1991 MAY	.300	.290	.295	.315	.320
1991 JUL	.225	.220	.215	.210	.210
1991 SEP	.250	.260	.260	.260	.265
1991 NOV	.185	.190	.195	.215	.220
1992 JAN	.295	.290	.	.255	.255
1992 APR	.495	.485	.	.300	.295
1992 JUL	.200	.175	.	.160	.165
1992 OCT	.290	.330	.	.325	.330
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A	
1991 JAN	.300	.150	.140	.160	.150
1991 MAR	.230	.140	.130	.170	.120
1991 MAY	.270	.220	.160	.140	.160
1991 JUL	.220	.140	.140	.320	.140
1991 SEP	.220	.190	.170	.230	.190
1991 NOV	.430	.160	.150	.170	.170
1992 JAN	.210	.460	.	.140	.160
1992 APR	.240	.190	.	.140	.150
1992 JUL	.190	.150	.	.150	.160
1992 OCT	.230	.160	.	.150	.150
PH (DMMSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)	
1991 JAN	8.240	8.140	8.080	8.150	8.190
1991 MAR	8.300	8.200	8.190	8.230	8.220
1991 MAY	8.240	8.130	8.140	8.060	8.140
1991 JUL	8.330	8.080	8.110	8.110	8.100
1991 SEP	8.260	8.150	8.080	8.130	8.100
1991 NOV	8.180	8.150	8.060	8.060	8.150
1992 JAN	8.250	8.220	.	.	8.270
1992 APR	8.340	8.270	.	.	8.310
1992 JUL	8.310	8.240	.	.	8.290
1992 OCT	8.220	8.000	.	.	8.070

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHEMISTRY (LABORATORY)					
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = 0.0005		GUIDELINE = N/A	
1991 JAN	.037	BOL			
1991 MAR	.007	.000 <T			
1991 MAY	.018	.000 <T			
1991 JUL	.004	BOL			
1991 SEP	.004	.000 <T			
1991 NOV	.014	.000 <T			
1992 JAN	.004	BOL			
1992 APR	.016	BOL			
1992 JUL	.001 <T	BOL			
1992 OCT	.005	BOL			
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = 0.40 (F2)	
1991 JAN	.108	.004 <T			
1991 MAR	.071	.003 <T			
1991 MAY	.068	.002 <T			
1991 JUL	.017	.002 <T			
1991 SEP	.004 <T	.004 <T			
1991 NOV	.130	.003 <T			
1992 JAN	.026	BOL			
1992 APR	.038	.002 <T			
1992 JUL	.010	BOL			
1992 OCT	.043	.002 <T			
RESIDUE FILTRATE (MG/L)		DET'N LIMIT = N/A		GUIDELINE = 500 (A3)	
1991 JAN	184.000 CRO	195.000 CRO	190.000 CRO	192.000 CRO	192.000 CRO
1991 MAR	180.000 CRO	184.000 CRO	180.000 CRO	184.000 CRO	184.000 CRO
1991 MAY	174.000 CRO	179.000 CRO	179.000 CRO	179.000 CRO	179.000 CRO
1991 JUL	181.000 CRO	185.000 CRO	185.000 CRO	187.000 CRO	188.000 CRO
1991 SEP	180.000 CRO	185.000 CRO	184.000 CRO	185.000 CRO	189.000 CRO
1991 NOV	181.000 CRO	190.000 CRO	190.000 CRO	192.000 CRO	191.000 CRO
1992 JAN	167.000 CRO	172.000 CRO		176.000 CRO	176.000 CRO
1992 APR	185.000 CRO	190.000 CRO		185.000 CRO	185.000 CRO
1992 JUL	181.000 CRO	185.000 CRO		186.000 CRO	186.000 CRO
1992 OCT	174.000 CRO	182.000 CRO		186.000 CRO	185.000 CRO

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHEMISTRY (LABORATORY)					
SULPHATE (MG/L)		DET'N LIMIT = 0.20		GUIDELINE = 500 (A3)	
1991 JAN	22.910	33.730	32.360	32.440	32.810
1991 MAR	21.870	27.250	27.930	26.540	26.500
1991 MAY	22.770	26.850	26.090	26.340	26.190
1991 JUL	22.570	25.520	25.480	25.430	25.030
1991 SEP	22.950	26.050	26.070	25.460	25.790
1991 NOV	23.940	31.040	30.640	29.800	29.130
1992 JAN	21.320	26.120	.	26.440	26.580
1992 APR	23.610	29.010	.	28.090	28.520
1992 JUL	23.760	27.140	.	27.300	27.790
1992 OCT	22.740	27.960	.	29.920	29.790
TURBIDITY (FTU)					
		DET'N LIMIT = 0.05		GUIDELINE = 1.0 (A1)	
1991 JAN	103.000	.270	.690	.370	.510
1991 MAR	30.000	.160	.330	.260	.360
1991 MAY	61.000	.330	.430	.230 <†	.370
1991 JUL	9.800	.260	.140	.270	.230
1991 SEP	8.300	.350	.340	.380	.170
1991 NOV	112.000	.270	.320	.220 <†	.260
1992 JAN	11.200	.360	.	.340	.490
1992 APR	45.000	.740	.	.470	.280
1992 JUL	7.800	.170 <†	.	.150 <†	.170 <†
1992 OCT	38.000	.350	.	.300	.520

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	TREATMENT PLANT	DIST. SYSTEM R R 1 UNION		DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE		DIST. SYSTEM RAVEN AVE STANDING
			FREE FLOW	STANDING		FREE FLOW	STANDING	
METALS								
SILVER (UG/L)								
) DET*N LIMIT = 0.05								
GUIDELINE = N/A								
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 APR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 OCT	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)								
) DET*N LIMIT = 0.10								
GUIDELINE = 100 (A4)								
1991 JAN	360.000	36.000	34.000	43.000	43.000	34.000	34.000	36.000
1991 MAR	160.000	46.000	42.000	43.000	43.000	37.000	37.000	43.000
1991 MAY	350.000	91.000	88.000	77.000	77.000	69.000	69.000	81.000
1991 JUL	110.000	160.000	130.000	120.000	120.000	94.000	94.000	110.000
1991 SEP	110.000	140.000	96.000	92.000	92.000	76.000	76.000	74.000
1991 NOV	480.000	84.000	86.000	80.000	80.000	90.000	90.000	100.000
1992 JAN	120.000	52.000	52.000	52.000	52.000	44.000	44.000	54.000
1992 APR	320.000	88.000	88.000	88.000	88.000	41.000	41.000	62.000
1992 JUL	61.000	140.000	140.000	140.000	140.000	140.000	140.000	140.000
1992 OCT	210.000	130.000	130.000	130.000	130.000	100.000	100.000	96.000
ARSENIC (UG/L)								
) DET*N LIMIT = 0.10								
GUIDELINE = 25 (A1)								
1991 JAN	1.100	.290 <T	.280 <T	.350 <T	.350 <T	.400 <T	.400 <T	.460 <T
1991 MAR	.880 <T	.130 <T	.130 <T	.140 <T	.140 <T	.140 <T	.140 <T	.140 <T
1991 MAY	.910 <T	.510 <T	.340 <T	.440 <T	.440 <T	.570 <T	.570 <T	.330 <T
1991 JUL	.730 <T	.330 <T	.420 <T	.480 <T	.480 <T	.440 <T	.440 <T	.520 <T
1991 SEP	.840 <T	.550 <T	.490 <T	.550 <T	.550 <T	.450 <T	.450 <T	.480 <T
1991 NOV	1.400	.260 <T	.440 <T	.440 <T	.440 <T	.370 <T	.370 <T	.390 <T
1992 JAN	.770 <T	.230 <T	.230 <T	.230 <T	.230 <T	.620 <T	.620 <T	.310 <T
1992 APR	.940 <T	.500 <T	.500 <T	.500 <T	.500 <T	.470 <T	.470 <T	.440 <T
1992 JUL	.870 <T	.500 <T	.500 <T	.500 <T	.500 <T	.590 <T	.590 <T	.730 <T
1992 OCT	1.200	.420 <T	.420 <T	.420 <T	.420 <T	.440 <T	.440 <T	.450 <T

TABLE 4
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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	TREATMENT PLANT R R 1 UNION	DIST. SYSTEM FREE FLOW	DIST. SYSTEM STANDING	DIST. SYSTEM RAVEN AVE	DIST. SYSTEM STANDING	DIST. SYSTEM RAVEN AVE	DIST. SYSTEM STANDING
METALS								
BARIUM (UG/L)								
DET'N LIMIT = 0.05								
GUIDELINE = 1000 (A2)								
1991 JAN	29.000	24.000	24.000	23.000	25.000	23.000	25.000	23.000
1991 MAR	22.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000
1991 MAY	24.000	21.000	21.000	21.000	21.000	21.000	21.000	22.000
1991 JUL	21.000	21.000	21.000	22.000	22.000	23.000	22.000	22.000
1991 SEP	24.000	23.000	23.000	23.000	22.000	23.000	22.000	22.000
1991 NOV	34.000	22.000	22.000	23.000	23.000	23.000	23.000	23.000
1992 JAN	22.000	22.000	22.000	*	20.000	22.000	20.000	22.000
1992 APR	25.000	22.000	22.000	*	18.000	23.000	23.000	23.000
1992 JUL	24.000	23.000	23.000	*	24.000	25.000	25.000	25.000
1992 OCT	24.000	24.000	24.000	*	24.000	23.000	23.000	23.000
BORON (UG/L)								
DET'N LIMIT = 2.00								
GUIDELINE = 5000 (A1)								
1991 JAN	26.000	24.000	22.000	25.000	24.000	25.000	25.000	25.000
1991 MAR	21.000	19.000 <T	20.000 <T	21.000	21.000	21.000	20.000 <T	20.000 <T
1991 MAY	17.000 <T	20.000 <T	18.000 <T	21.000	18.000 <T	19.000	19.000	19.000
1991 JUL	24.000	25.000	22.000	25.000	25.000	25.000	25.000	25.000
1991 SEP	21.000	21.000	33.000	34.000	23.000	27.000	27.000	27.000
1991 NOV	26.000	25.000	30.000	31.000	25.000	27.000	27.000	27.000
1992 JAN	20.000 <T	20.000 <T	*	*	20.000 <T	28.000	28.000	28.000
1992 APR	20.000 <T	23.000	*	*	20.000 <T	23.000	23.000	23.000
1992 JUL	34.000	23.000	*	*	35.000	23.000	23.000	23.000
1992 OCT	26.000	25.000	*	*	24.000	25.000	25.000	25.000
BERYLLIUM (UG/L)								
DET'N LIMIT = 0.05								
GUIDELINE = 6800 (D4)								
1991 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	*	*	BDL	BDL	BDL	BDL
1992 APR	BDL	BDL	*	*	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	*	*	BDL	BDL	BDL	BDL
1992 OCT	BDL	BDL	*	*	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW		TREATMENT PLANT TREATED		DIST. SYSTEM R R 1 UNION		DIST. SYSTEM RAVEN AVE		DIST. SYSTEM RAVEN AVE	
				FREE FLOW		STANDING		STANDING	
METALS									
CADMIUM (UG/L)				DET'N LIMIT = 0.05		GUIDELINE = 5.0 (A1)			
1991 JAN	BDL	BDL	BDL	BDL	.060 <T	BDL	BDL	BDL	BDL
1991 MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	.100 <T	.070 <T	.070 <T	.080 <T	.080 <T	.080 <T
1991 SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 APR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 OCT	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
COBALT (UG/L)				DET'N LIMIT = 0.02		GUIDELINE = N/A			
1991 JAN	.640 <T	.110 <T	.130 <T	.200 <T	.180 <T	BDL	BDL	BDL	.140 <T
1991 MAR	.130 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 MAY	.480 <T	.120 <T	.050 <T	.150 <T	BDL	BDL	BDL	BDL	BDL
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	.200 <T	.080 <T	BDL	BDL	.050 <T	BDL	BDL	BDL	BDL
1991 NOV	.950 <T	.090 <T	.100 <T	.070 <T	.040 <T	.040 <T	.080 <T	.060 <T	.060 <T
1992 JAN	.230 <T	.070 <T	BDL	BDL	.080 <T	BDL	BDL	.070 <T	.070 <T
1992 APR	.550 <T	.240 <T	BDL	BDL	.160 <T	BDL	BDL	.230 <T	.230 <T
1992 JUL	.290 <T	.350 <T	BDL	BDL	.270 <T	BDL	BDL	.260 <T	.260 <T
1992 OCT	.550 <T	.240 <T	BDL	BDL	.260 <T	BDL	BDL	.210 <T	.210 <T
CHROMIUM (UG/L)				DET'N LIMIT = 0.50		GUIDELINE = 50.0 (A1)			
1991 JAN	3.300 <T	1.700 <T	.520 <T	2.100 <T	1.100 <T	BDL	BDL	2.400 <T	2.400 <T
1991 MAR	2.700 <T	.850 <T	1.500 <T	2.100 <T	1.400 <T	BDL	BDL	.770 <T	.770 <T
1991 MAY	1.000 <T	.980 <T	BDL	2.200 <T	2.900 <T	BDL	BDL	.570 <T	.570 <T
1991 JUL	3.100 <T	2.600 <T	1.400 <T	2.900 <T	2.900 <T	BDL	BDL	2.900 <T	2.900 <T
1991 SEP	.570 <T	BDL	2.000 <T	2.300 <T	1.830 <T	BDL	BDL	1.400 <T	1.400 <T
1991 NOV	2.100 <T	1.600 <T	2.700 <T	3.000 <T	1.300 <T	BDL	BDL	1.700 <T	1.700 <T
1992 JAN	.980 <T	BDL	BDL	BDL	.640 <T	BDL	BDL	2.600 <T	2.600 <T
1992 APR	.760 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1992 JUL	2.100 <T	1.700 <T	BDL	BDL	2.400 <T	BDL	BDL	.510 <T	.510 <T
1992 OCT	2.200 <T	BDL	BDL	BDL	.750 <T	BDL	BDL	1.800 <T	1.800 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW		TREATMENT PLANT TREATED		DIST. SYSTEM R R 1 UNION		DIST. SYSTEM R R 1 UNION		DIST. SYSTEM RAVEN AVE		DIST. SYSTEM RAVEN AVE	
				FREE FLOW		STANDING		FREE FLOW		STANDING	
METALS											
COPPER (UG/L)											
DET'N LIMIT = 0.50											
GUIDELINE = 1000 (A3)											
1991 JAN	3,700 <T	1,000 <T	2,100 <T	8,700	3,600 <T	21,000					
1991 MAR	1,800 <T	.920 <T	2,300 <T	7,200	3,700 <T	25,000					
1991 MAY	2,400 <T	.990 <T	3,200 <T	7,300	3,600 <T	30,000					
1991 JUL	1,700 <T	.900 <T	1,600 <T	7,200	3,100 <T	20,000					
1991 SEP	1,500 <T	.850 <T	1,800 <T	2,300 <T	3,200 <T	15,000					
1991 NOV	4,100 <T	1,100 <T	2,200 <T	9,000	2,800 <T	21,000					
1992 JAN	1,400 <T	.920 <T	.	.	3,200 <T	26,000					
1992 APR	1,900 <T	1,100 <T	.	.	2,600 <T	29,000					
1992 JUL	1,400 <T	1,100 <T	.	.	2,700 <T	15,000					
1992 OCT	1,800 <T	.930 <T	.	.	2,100 <T	8,300					
IRON (UG/L)											
DET'N LIMIT = 6.00											
GUIDELINE = 300 (A3)											
1991 JAN	670,000	BOL	BOL	BOL	19,000 <T	18,000 <T					
1991 MAR	420,000	16,000 <T	9,100 <T	7,900 <T	18,000 <T	27,000 <T					
1991 MAY	790,000	BOL	BOL	BOL	11,000 <T	11,000 <T					
1991 JUL	200,000	BOL	BOL	BOL	23,000 <T	25,000 <T					
1991 SEP	170,000	BOL	BOL	BOL	9,200 <T	15,000 <T					
1991 NOV	1100,000	BOL	BOL	16,000 <T	21,000 <T	23,000 <T					
1992 JAN	250,000	6,200 <T	.	.	31,000 <T	25,000 <T					
1992 APR	560,000	23,000 <T	.	.	17,000 <T	24,000 <T					
1992 JUL	110,000	BOL	.	.	21,000 <T	22,000 <T					
1992 OCT	460,000	12,000 <T	.	.	17,000 <T	13,000 <T					
MERCURY (UG/L)											
DET'N LIMIT = 0.02											
GUIDELINE = 1.0 (A1)											
20 SAMPLES											
MANGANESE (UG/L)											
DET'N LIMIT = 0.05											
GUIDELINE = 50.0 (A3)											
1991 JAN	60,000	1,100	1,200	1,000	1,900	1,700					
1991 MAR	37,000	.530	.500 <T	.500 <T	1,600	1,000					
1991 MAY	39,000	.370 <T	.250 <T	.330 <T	1,300	1,660					
1991 JUL	12,000	.230 <T	.190 <T	.300 <T	1,500	1,600					
1991 SEP	25,000	.470 <T	.520	.390 <T	2,400	2,800					
1991 NOV	270,000	.690	.570	2,400	2,800	3,000					
1992 JAN	19,000	.390 <T	.	.	2,300	1,500					
1992 APR	25,000	.940	.	.	1,800	1,600					
1992 JUL	11,000	.410 <T	.	.	2,500	2,400					
1992 OCT	29,000	.410 <T	.	.	2,500	2,500					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW		TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
METALS						
MOLYBDENUM (UG/L)						
DET'N LIMIT = 0.05						
GUIDELINE = N/A						
1991 JAN	.420 <T	1.300	1.400	1.400	1.300	1.200
1991 MAR	.860	1.300	1.100	1.200	1.200	1.100
1991 MAY	.540	1.200	1.100	1.200	1.100	1.100
1991 JUL	1.100	1.200	1.300	1.200	1.200	1.200
1991 SEP	1.000	1.300	1.600	1.600	1.200	1.200
1991 NOV	.400 <T	1.200	1.400	1.400	1.400	1.400
1992 JAN	.810	1.200	.	.	2.700	1.200
1992 APR	.690	1.200	.	.	1.100	1.300
1992 JUL	1.200	1.300	.	.	1.200	1.300
1992 OCT	.890	1.300	.	.	1.300	1.200
NICKEL (UG/L)						
DET'N LIMIT = 0.20						
GUIDELINE = 350 (03)						
1991 JAN	.640 <T	BDL	.580 <T	.560 <T	.510 <T	1.100 <T
1991 MAR	BDL	BDL	BDL	BDL	BDL	.310 <T
1991 MAY	2.000 <T	1.300 <T	.770 <T	1.400 <T	.320 <T	1.700 <T
1991 JUL	BDL	BDL	BDL	BDL	BDL	BDL
1991 SEP	.880 <T	.580 <T	BDL	BDL	.730 <T	2.700
1991 NOV	1.300 <T	BDL	BDL	BDL	BDL	1.600 <T
1992 JAN	.460 <T	BDL	.	.	BDL	BDL
1992 APR	3.200	2.400	.	.	2.700	3.600
1992 JUL	2.700	2.500	.	.	2.400	3.500
1992 OCT	3.400	2.100	.	.	2.100	12.000
LEAD (UG/L)						
DET'N LIMIT = 0.05						
GUIDELINE = 10 (A1)						
1991 JAN	1.100	BDL	.170 <T	1.200	.320 <T	1.800
1991 MAR	.450 <T	BDL	.210 <T	.930	.250 <T	1.600
1991 MAY	.710	BDL	.420 <T	.480 <T	.220 <T	2.000
1991 JUL	.250 <T	BDL	.120 <T	1.000	.400 <T	2.600
1991 SEP	.190 <T	BDL	.090 <T	.090 <T	.460 <T	1.700
1991 NOV	2.100	.060 <T	.220 <T	1.600	.330 <T	2.700
1992 JAN	.330 <T	.110 <T	.	.	.360 <T	2.300
1992 APR	.440 <T	.280 <T	.	.	.330 <T	2.000
1992 JUL	.130 <T	2.900	.	.	.350 <T	2.000
1992 OCT	.500 <T	BDL	.	.	.340 <T	1.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
METALS					
ANTIMONY (UG/L)					
		DET'N LIMIT = 0.05		GUIDELINE = 146 (D4)	
1991 JAN	.260 <T	.440 <T	.530	.510	.470 <T
1991 MAR	.540	.500 <T	.510	.480 <T	.620
1991 MAY	.360 <T	.530	.440 <T	.690	.830
1991 JUL	.700	.660	.620	.840	.910
1991 SEP	.370 <T	.490 <T	.470 <T	.470 <T	.630
1991 NOV	.360 <T	.550	.600	.720	.880
1992 JAN	.650	.480 <T	.	.650	.890
1992 APR	.450 <T	.580	.	.460 <T	.840
1992 JUL	.520	.460 <T	.	.680	.750
1992 OCT	.470 <T	.490 <T	.	.550	.630
SELENIUM (UG/L)					
		DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)	
1991 JAN	BOL	BOL	BOL	1.100 <T	1.200 <T
1991 MAR	BOL	BOL	1.200 <T	BOL	1.300 <T
1991 MAY	BOL	BOL	BOL	BOL	BOL
1991 JUL	BOL	BOL	2.200 <T	1.400 <T	1.800 <T
1991 SEP	BOL	BOL	BOL	BOL	BOL
1991 NOV	BOL	BOL	2.100 <T	BOL	BOL
1992 JAN	BOL	BOL	1.100 <T	1.100 <T	BOL
1992 APR	BOL	BOL	.	1.200 <T	BOL
1992 JUL	BOL	BOL	.	1.300 <T	BOL
1992 OCT	BOL	BOL	.	1.600 <T	BOL
STRONTIUM (UG/L)					
		DET'N LIMIT = 0.10		GUIDELINE = N/A	
1991 JAN	170.000	160.000	170.000	180.000	160.000
1991 MAR	150.000	150.000	140.000	140.000	140.000
1991 MAY	150.000	150.000	140.000	150.000	150.000
1991 JUL	150.000	150.000	150.000	160.000	150.000
1991 SEP	150.000	160.000	160.000	150.000	150.000
1991 NOV	170.000	160.000	160.000	170.000	160.000
1992 JAN	140.000	140.000	.	140.000	150.000
1992 APR	160.000	160.000	.	150.000	160.000
1992 JUL	170.000	170.000	.	170.000	170.000
1992 OCT	170.000	150.000	.	160.000	160.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
METALS					
TITANIUM (UG/L)					
DET'N LIMIT = 0.50					
GUIDELINE = N/A					
1991 JAN	8.600	2.700 <T	2.600 <T	2.700 <T	2.500 <T
1991 MAR	7.500	2.700 <T	2.400 <T	2.400 <T	2.300 <T
1991 MAY	10.000	2.100 <T	1.500 <T	2.300 <T	1.800 <T
1991 JUL	5.500	2.900 <T	2.600 <T	2.600 <T	2.700 <T
1991 SEP	4.100 <T	1.300 <T	1.100 <T	1.300 <T	1.300 <T
1991 NOV	7.600	1.700 <T	1.600 <T	2.000 <T	1.600 <T
1992 JAN	4.500 <T	1.500 <T	.	1.300 <T	1.400 <T
1992 APR	11.000	4.500 <T	.	.	3.600 <T
1992 JUL	6.900	5.200	.	2.700 <T	4.700 <T
1992 OCT	9.600	3.000 <T	.	4.700 <T	3.200 <T
THALLIUM (UG/L)					
DET'N LIMIT = 0.05					
GUIDELINE = 13 (04)					
52 SAMPLES					
BDL					
BDL					
BDL					
URANIUM (UG/L)					
DET'N LIMIT = 0.05					
GUIDELINE = 100 (A1)					
1991 JAN	.460 <T	.310 <T	.280 <T	.300 <T	.280 <T
1991 MAR	.420 <T	.300 <T	.290 <T	.330 <T	.280 <T
1991 MAY	.360 <T	.260 <T	.280 <T	.260 <T	.280 <T
1991 JUL	.320 <T	.310 <T	.320 <T	.320 <T	.310 <T
1991 SEP	.370 <T	.310 <T	.310 <T	.340 <T	.290 <T
1991 NOV	.440 <T	.300 <T	.270 <T	.320 <T	.310 <T
1992 JAN	.370 <T	.290 <T	.	.270 <T	.300 <T
1992 APR	.330 <T	.320 <T	.	.	.270 <T
1992 JUL	.460 <T	.320 <T	.	.340 <T	.330 <T
1992 OCT	.380 <T	.260 <T	.	.	.310 <T
VANADIUM (UG/L)					
DET'N LIMIT = 0.05					
GUIDELINE = N/A					
1991 JAN	1.000	.420 <T	.490 <T	.500 <T	.370 <T
1991 MAR	.640	.480 <T	.380 <T	.410 <T	.400 <T
1991 MAY	.670	BDL	BDL	BDL	.130 <T
1991 JUL	.130 <T	BDL	BDL	BDL	.150 <T
1991 SEP	.390 <T	.420 <T	.390 <T	.410 <T	.350 <T
1991 NOV	1.500	.400 <T	.430 <T	.380 <T	.380 <T
1992 JAN	.280 <T	.	.	.170 <T	.440 <T
1992 APR	.960	.500 <T	.	.	.260 <T
1992 JUL	.180 <T	.250 <T	.	.290 <T	.480 <T
1992 OCT	.750	.580	.	.260 <T	.270 <T
			.	.520	.520

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

ZINC (UG/L)	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	METALS				GUIDELINE = 5000 (A3)			
			DET'N LIMIT = 0.20		DET'N LIMIT = 0.20		DET'N LIMIT = 0.20		DET'N LIMIT = 0.20	
			TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R T UNION FREE FLOW	DIST. SYSTEM R R T UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
1991 JAN	4,500	1,500 <T	1,500 <T	2,200	7,900	2,800	2,800	5,700	2,800	5,700
1991 MAR	3,100	2,300	2,300	2,500	5,900	2,000 <T	2,000 <T	6,100	2,000 <T	6,100
1991 MAY	4,600	1,600 <T	1,600 <T	5,100	2,900	1,900 <T	1,900 <T	7,900	1,900 <T	7,900
1991 JUL	4,700	2,500	2,500	1,700 <T	6,200	3,200	3,200	11,000	3,200	11,000
1991 SEP	1,500 <T	960 <T	960 <T	510 <T	310 <T	970 <T	970 <T	4,100	970 <T	4,100
1991 NOV	7,600	3,800	3,800	2,800	7,800	2,200	2,200	9,000	2,200	9,000
1992 JAN	3,900	1,800 <T	1,800 <T	-	-	11,000	11,000	6,300	11,000	6,300
1992 APR	3,100	4,000	4,000	-	-	1,300 <T	1,300 <T	4,400	1,300 <T	4,400
1992 JUL	1,200 <T	1,600 <T	1,600 <T	-	-	1,400 <T	1,400 <T	3,000	1,400 <T	3,000
1992 OCT	4,000	2,600	2,600	-	-	2,200	2,200	3,000	2,200	3,000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN), WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHLOROBROMATICS					
HEXACHLOROBUTADIENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 450 (D4)	
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
123-TRICHLOROBENZENE (NG/L)					
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
1234-TETChLOROBENZENE (NG/L)					
1991 JAN	BDL	BDL	BDL	BDL	BDL
1991 MAR	10U	BDL	BDL	BDL	BDL
1991 MAY	11S	BDL	BDL	BDL	BDL
1991 JUL	1AW	BDL	BDL	BDL	BDL
1991 SEP	1AW	BDL	BDL	BDL	BDL
1991 NOV	BDL	BDL	BDL	BDL	BDL
1992 JAN	BDL	BDL	BDL	BDL	BDL
1992 APR	BDL	BDL	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL
1992 OCT	BDL	BDL	BDL	BDL	BDL
1235-TETChLOROBENZENE (NG/L)					
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
124-TRICHLOROBENZENE (NG/L)					
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
1245-TETChLOROBENZENE (NG/L)					
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
135-TRICHLOROBENZENE (NG/L)					
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
HEXACHLOROBENZENE (NG/L)					
25 SAMPLES	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHLORODAROMATICS					
HEXACHLOROETHANE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)	
1991 JAN	BDL	BDL	BDL	BDL	BDL
1991 MAR	!QU	BDL	BDL	BDL	BDL
1991 MAY	!IS	BDL	BDL	BDL	BDL
1991 JUL	!AW	!AW	!AW	!AW	!AW
1991 SEP	!AW	!AW	!AW	!AW	!AW
1991 NOV	BDL	BDL	BDL	2.000 <T	BDL
1992 JAN	BDL	5.000 <T	BDL	3.000 <T	BDL
1992 APR	BDL	5.000 <T	BDL	BDL	BDL
1992 JUL	BDL	BDL	BDL	BDL	BDL
1992 OCT	BDL	BDL	BDL	BDL	BDL
OCTACHLOROSTYRENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = N/A	
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
PENTACHLOROBENZENE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 74000 (D4)	
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
236-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A	
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
245-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A	
25 SAMPLES	BDL	BDL	BDL	BDL	BDL
26A-TRICHLOROTOLUENE (NG/L)		DET'N LIMIT = 5.000		GUIDELINE = N/A	
25 SAMPLES	BDL	BDL	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
CHLOROPHENOLS					
234-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = N/A	
1 SAMPLES	BDL		IIS		
2345-TETACHLOROPHENOL (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
1 SAMPLES	BDL		IIS		
2356-TETACHLOROPHENOL (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
1 SAMPLES	BDL		IIS		
245-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 2600000 (D4)	
1 SAMPLES	BDL		IIS		
246-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 5000 (A1)	
1 SAMPLES	BDL		IIS		
PENTACHLOROPHENOL (NG/L)		DET'N LIMIT = 10.00		GUIDELINE = 60000 (A1)	
1991 MAY	120.000		IIS		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM, 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
PESTICIDES AND PCB					
ALDRIN (NG/L)	BDL	BDL	BDL	GUIDELINE = 1,000	GUIDELINE = 700 (A1)
25 SAMPLES	BDL	BDL	BDL		BDL
ALPHA BHC (NG/L)	BDL	BDL	BDL	DET'N LIMIT = 1,000	GUIDELINE = 700 (G)
1991 JAN	BDL	BDL	BDL		BDL
1991 MAR	10U	11S	11S	2,000 <T	1,000 <T
1991 MAY	11S	BDL	BDL		BDL
1991 JUL	1AW	1AW	1AW		1AW
1991 SEP	1AW	1AW	1AW		1AW
1991 NOV	BDL	BDL	BDL		BDL
1992 JAN	BDL	BDL	BDL		BDL
1992 APR	BDL	BDL	BDL		BDL
1992 JUL	BDL	BDL	BDL		BDL
1992 OCT	BDL	BDL	BDL		BDL
BETA BHC (NG/L)	BDL	BDL	BDL	DET'N LIMIT = 1,00	GUIDELINE = 300 (G)
25 SAMPLES	BDL	BDL	BDL		BDL
LINDANE (GAMMA BHC) (NG/L)	BDL	BDL	BDL	DET'N LIMIT = 1,000	GUIDELINE = 4000 (A1)
25 SAMPLES	BDL	BDL	BDL		BDL
ALPHA CHLORDANE (NG/L)	BDL	BDL	BDL	DET'N LIMIT = 2,000	GUIDELINE = 7000 (A1)
25 SAMPLES	BDL	BDL	BDL		BDL
GAMMA CHLORDANE (NG/L)	BDL	BDL	BDL	DET'N LIMIT = 2,00	GUIDELINE = 7000 (A1)
25 SAMPLES	BDL	BDL	BDL		BDL
DIELORIN (NG/L)	BDL	BDL	BDL	DET'N LIMIT = 2,00	GUIDELINE = 700 (A1)
25 SAMPLES	BDL	BDL	BDL		BDL
METHOXYCHLOR (NG/L)	BDL	BDL	BDL	DET'N LIMIT = 5.0	GUIDELINE = 900000 (A1)
25 SAMPLES	BDL	BDL	BDL		BDL
ENDOSULFAN I (NG/L)	BDL	BDL	BDL	DET'N LIMIT = 2,00	GUIDELINE = 74000 (D4)
25 SAMPLES	BDL	BDL	BDL		BDL
ENDOSULFAN II (NG/L)	BDL	BDL	BDL	DET'N LIMIT = 5,000	GUIDELINE = 74000 (D4)
25 SAMPLES	BDL	BDL	BDL		BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
PESTICIDES AND PCB					
ENDRIN (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = 1600. (D3)	
25 SAMPLES	BDL	BDL	BDL		BDL
ENDOSULFAN SULPHATE (NG/L)		DET'N LIMIT = 5.00		GUIDELINE = N/A	
25 SAMPLES	BDL	BDL	BDL		BDL
HEPTACHLOR EPOXIDE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = 3000 (A1)	
18 SAMPLES	BDL	BDL	BDL		BDL
HEPTACHLOR (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = 3000 (A1)	
25 SAMPLES	BDL	BDL	BDL		BDL
MIREX (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = N/A	
25 SAMPLES	BDL	BDL	BDL		BDL
OXYCHLORDANE (NG/L)		DET'N LIMIT = 2,000		GUIDELINE = N/A	
25 SAMPLES	BDL	BDL	BDL		BDL
O,P-DDT (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = 30000 (A1)	
25 SAMPLES	BDL	BDL	BDL		BDL
PCB (NG/L)		DET'N LIMIT = 20.00		GUIDELINE = 3000 (A2)	
25 SAMPLES	BDL	BDL	BDL		BDL
P,P-DDD (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = 30000 (A1)	
25 SAMPLES	BDL	BDL	BDL		BDL
P,P-DDE (NG/L)		DET'N LIMIT = 1,000		GUIDELINE = 30000 (A1)	
25 SAMPLES	BDL	BDL	BDL		BDL
P,P-DDT (NG/L)		DET'N LIMIT = 5,000		GUIDELINE = 30000 (A1)	
25 SAMPLES	BDL	BDL	BDL		BDL
TOXAPHENE (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A1)	
19 SAMPLES	BDL	BDL	BDL		BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
PESTICIDES AND PCB					
AMETRINE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 300000 (03)	
15 SAMPLES	BDL				
ATRAZINE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 60000 (A2)	
1991 JAN	110.000 <T				
1991 MAR	260.000 <T				
1991 MAY	190.000 <T				
1991 JUL	1AW				
1991 SEP	1AW				
1991 NOV	110.000 <T				
1992 JAN	110.000 <T				
1992 APR	130.000 <T				
1992 JUL	110.000 <T				
1992 OCT	90.000 <T				
ATRATONE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = N/A	
15 SAMPLES	BDL				
CYANAZINE (BLADEX) (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 10000 (A2)	
15 SAMPLES	BDL				
DESETHYL ATRAZINE (NG/L)		DET'N LIMIT = 200.0		GUIDELINE = 60000 (A2)	
1991 JAN	BDL				
1991 MAR	BDL				
1991 MAY	240.000 <T				
1991 JUL	1AW				
1991 SEP	1AW				
1991 NOV	BDL				
1992 JAN	BDL				
1992 APR	BDL				
1992 JUL	BDL				
1992 OCT	BDL				
DESETHYL SIMAZINE (NG/L)		DET'N LIMIT = 200.0		GUIDELINE = 10000 (A2)	
15 SAMPLES	BDL				
PROMETONE (NG/L)		DET'N LIMIT = 50.000		GUIDELINE = 52500 (03)	
15 SAMPLES	BDL				

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
PESTICIDES AND PCB					
PROPANE (NG/L)		DET'N LIMIT = 50.000		GUIDELINE = 700000 (D3)	
15 SAMPLES	BDL				
PROMETRYNE (NG/L)		DET'N LIMIT = 50.000		GUIDELINE = 1000 (A2)	
15 SAMPLES	BDL				
METRIBUZIN (SENCOR) (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 80000 (A1)	
15 SAMPLES	BDL				
SIMAZINE (NG/L)		DET'N LIMIT = 50.00		GUIDELINE = 10000 (A2)	
15 SAMPLES	BDL				
ALACHLOR (LASSO) (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A2)	
15 SAMPLES	BDL				
METOLACHLOR (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 50000 (A2)	
15 SAMPLES	BDL				
HEXACYCLOPENTAOTEN (NG/L)		DET'N LIMIT = 5.00		GUIDELINE = 206000 (D4)	
1991 JAN	BDL				
1991 MAR	10U				
1991 MAY	11S	22.000 <T			BDL
1991 JUL	1AW	BDL			36.000 <T
1991 SEP	1AW	12.000 <T			17.000 <T
1991 NOV	1AW	1AW			1AW
1991 DEC	BDL	11.000 <T			1AW
1992 JAN	BDL	22.000 <T			12.000 <T
1992 APR	10U				20.000 <T
1992 JUL	10U				10U
1992 OCT	10U				10U

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
PHENOLICS					
PHENOLICS (UG/L)	DET'N LIMIT = 0.2		GUIDELINE = N/A		
1991 JAN	.600 <T	.400 <T			
1991 MAR	.600 <T	.400 <T			
1991 MAY	.400 <T	BDL			
1991 JUL	.400 <T	BDL			
1991 SEP	.400 <T	BDL			
1991 NOV	.400 <T	.400 <T			
1992 JAN	BDL	BDL			
1992 APR	.400 <T	BDL			
1992 JUL	BDL	BDL			
1992 OCT	BDL	BDL			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
POLYAROMATIC HYDROCARBONS					
PHENANTHRENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL			BDL
ANTHRACENE (NG/L)		DET'N LIMIT = 1.0		GUIDELINE = N/A	
11 SAMPLES	BDL	BDL			BDL
FLUORANTHENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 42000 (04)	
15 SAMPLES	BDL	BDL			BDL
PYRENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL			BDL
BENZO(A)ANTHRACENE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL			BDL
CHRYSENE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL			BDL
01METH. BENZO(A)ANTHR (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = N/A	
11 SAMPLES	BDL	BDL			BDL
BENZO(E) PYRENE (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL			BDL
BENZO(B) FLUORANTHENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL			BDL
PERYLENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL			BDL
BENZO(K) FLUORANTHENE (NG/L)		DET'N LIMIT = 1.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL			BDL
BENZO(A) PYRENE (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = 10 (A1)	
11 SAMPLES	BDL	BDL			BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R T UNION FREE FLOW	DIST. SYSTEM R R T UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
POLYAROMATIC HYDROCARBONS					
BENZO(G,H,I) PERYLEN (NG/L)	BDL	DET'N LIMIT = 20.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL		BDL	
DIBENZO(A,H) ANTHRAC (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL		BDL	
INDENO(1,2,3-C,D) PY (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL		BDL	
BENZO(B) CHRYSENE (NG/L)		DET'N LIMIT = 2.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL		BDL	
CORONENE (NG/L)		DET'N LIMIT = 10.0		GUIDELINE = N/A	
15 SAMPLES	BDL	BDL		BDL	

TABLE 4
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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
SPECIFIC PESTICIDES					
TOXAPHENE (NG/L)		DET'N LIMIT = 500.0		GUIDELINE = 5000 (A1)	
6 SAMPLES	BDL	BDL			BDL
2,4,5-T (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 280000 (A1)	
1 SAMPLES	BDL	!!S			
2,4-D (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = 100000 (A1)	
1 SAMPLES	BDL	!!S			
2,4-DB (NG/L)		DET'N LIMIT = 200.0		GUIDELINE = N/A	
1 SAMPLES	BDL	!!S			
2,4 D PROPIONIC ACID (NG/L)		DET'N LIMIT = 100.0		GUIDELINE = N/A	
1 SAMPLES	BDL	!!S			
DICAMBA (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 120000 (A1)	
1 SAMPLES	BDL	!!S			
2,4,5-TP (SILVEX) (NG/L)		DET'N LIMIT = 20.00		GUIDELINE = 10000 (A1)	
1 SAMPLES	BDL	!!S			
DIAZINON (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 20000 (A1)	
1 SAMPLES	BDL	!!S			
DICHLOROVOS (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
1 SAMPLES	BDL	!!S			
CHLORPYRIFOS (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
1 SAMPLES	BDL	!!S			
ETHION (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 35000 (G)	
1 SAMPLES	BDL	!!S			
AZINPHOS-METHYL (NG/L)		DET'N LIMIT = N/A		GUIDELINE = N/A	
1 SAMPLES	BDL	!NP			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
SPECIFIC PESTICIDES					
MALATHION (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 190000 (A1)	
1 SAMPLES	BDL	IIS			
MEVINPHOS (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
1 SAMPLES	BDL	IIS			
METHYL PARATHION (NG/L)		DET'N LIMIT = 50.0		GUIDELINE = 9000 (03)	
1 SAMPLES	BDL	IIS			
METHYLTRITHION (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
1 SAMPLES	BDL	IIS			
PARATHION (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 50000 (A1)	
1 SAMPLES	BDL	IIS			
PHORATE (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = 2000 (A2)	
1 SAMPLES	BDL	IIS			
RELDAN (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
1 SAMPLES	BDL	IIS			
RONNEL (NG/L)		DET'N LIMIT = 20.0		GUIDELINE = N/A	
1 SAMPLES	BDL	IIS			
CARBOFURAN (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = 90000 (A1)	
1 SAMPLES	BDL	IIS			
CHLOROPHOS (CIPC) (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = 350000 (G)	
1 SAMPLES	BDL	IIS			
DIALLATE (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = N/A	
1 SAMPLES	BDL	IIS			
EPTAM (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = N/A	
1 SAMPLES	BDL	IIS			

TABLE 4
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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
SPECIFIC PESTICIDES					
IPC (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = N/A	
1 SAMPLES	BDL	IIS			
PROPOXUR (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = 140000 (D3)	
1 SAMPLES	BDL	IIS			
CARBARYL (NG/L)		DET'N LIMIT = 200.0		GUIDELINE = 90000 (A1)	
1 SAMPLES	BDL	IIS			
BUTYLATE (NG/L)		DET'N LIMIT = 2000.0		GUIDELINE = 245000 (D3)	
1 SAMPLES	BDL	IIS			

TABLE 4
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TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
VOLATILES					
BENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)	
36 SAMPLES	BDL	BDL		BDL	

TOLUENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 24 (A3)	
36 SAMPLES	BDL	BDL		BDL	

ETHYLBENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 2.4 (A3)	
1991 JAN	BDL	BDL		BDL	
1991 MAR	BDL	.150 <T		.100 <T	
1991 MAY	.050 <T	BDL		BDL	
1991 JUL	BDL	.100 <T		BDL	
1991 SEP	BDL	.150 <T		BDL	
1991 NOV	BDL	.050 <T		BDL	
1992 JAN	BDL	.100 <T		.100 <T	
1992 APR	BDL	.200 <T		.100 <T	
1992 JUL	.100 <T	.100 <T		.100 <T	
1992 OCT	.050 <T	.100 <T		.100 <T	

P-XYLENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)	
36 SAMPLES	BDL	BDL		BDL	

M-XYLENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)	
1991 JAN	BDL	BDL		BDL	
1991 MAR	BDL	BDL		BDL	
1991 MAY	BDL	BDL		BDL	
1991 JUL	BDL	BDL		BDL	
1991 SEP	BDL	BDL		BDL	
1991 NOV	BDL	BDL		BDL	
1992 JAN	BDL	.100 <T		BDL	
1992 APR	BDL	BDL		BDL	
1992 JUL	.100 <T	BDL		BDL	
1992 OCT	BDL	BDL		BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
VOLATILES					
O-XYLENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 300 (A3*)	
1991 JAN	BOL	BOL	-	BOL	-
1991 MAR	BOL	BOL	-	BOL	-
1991 MAY	BOL	BOL	-	BOL	-
1991 JUL	BOL	BOL	-	BOL	-
1991 SEP	BOL	BOL	-	BOL	-
1991 NOV	BOL	BOL	-	BOL	-
1992 JAN	BOL	.050 <T	-	BOL	-
1992 APR	BOL	-	-	BOL	-
1992 JUL	.050 <T	-	-	BOL	-
1992 OCT	BOL	-	-	BOL	-
STYRENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 100 (D1)	
1991 JAN	BOL	.100 <T	-	BOL	-
1991 MAR	BOL	.150 <T	-	.250 <T	-
1991 MAY	.100 <T	.050 <T	-	.050 <T	-
1991 JUL	BOL	BOL	-	BOL	-
1991 SEP	BOL	.250 <T	-	BOL	-
1991 NOV	BOL	BOL	-	BOL	-
1992 JAN	BOL	-	-	.250 <T	-
1992 APR	BOL	.050 <T	-	.200 <T	-
1992 JUL	.150 <T	BOL	-	.150 <T	-
1992 OCT	BOL	-	-	.200 <T	-
1,1-DICHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.100		GUIDELINE = 7 (D1)	
36 SAMPLES	BOL	BOL	-	BOL	-
METHYLENE CHLORIDE (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 50 (A1)	
36 SAMPLES	BOL	BOL	-	BOL	-
1,1,2-DICHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 70 (D1)	
36 SAMPLES	BOL	BOL	-	BOL	-
1,1-DICHLOROETHANE (UG/L)		DET'N LIMIT = 0.100		GUIDELINE = N/A	
36 SAMPLES	BOL	BOL	-	BOL	-

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
VOLATILES					
CHLOROFORM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)	
1991 JAN	BDL	12.300	3.500	7.300	.
1991 MAR	BDL	12.600	4.600	8.400	.
1991 MAY	BDL	11.100	5.000	12.000	.
1991 JUL	BDL	22.800	7.900	15.000	.
1991 SEP	2.200 <1	26.600	10.700	20.100	.
1991 NOV	BDL	17.600	17.000	14.600	.
1992 JAN	BDL	12.600	.	8.600	.
1992 APR	BDL	15.600	.	8.700	.
1992 JUL	BDL	16.800	.	15.300	.
1992 OCT	BDL	13.800	.	14.800	.
1,1,1-TRICHLOROETHANE (UG/L)					
		DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)	
36 SAMPLES	BDL	BDL	BDL	BDL	.
1,2-DICHLOROETHANE (UG/L)					
		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)	
36 SAMPLES	BDL	BDL	BDL	BDL	.
CARBON TETRACHLORIDE (UG/L)					
		DET'N LIMIT = 0.20		GUIDELINE = 5 (A1)	
36 SAMPLES	BDL	BDL	BDL	BDL	.
1,2-DICHLOROPROPANE (UG/L)					
		DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)	
36 SAMPLES	BDL	BDL	BDL	BDL	.
TRICHLOROETHYLENE (UG/L)					
		DET'N LIMIT = 0.10		GUIDELINE = 50 (A1)	
36 SAMPLES	BDL	BDL	BDL	BDL	.
DIBROMOBROMOMETHANE (UG/L)					
		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)	
1991 JAN	BDL	9.900	2.900	6.000	.
1991 MAR	BDL	9.600	3.350	6.350	.
1991 MAY	BDL	8.900	4.450	8.150	.
1991 JUL	BDL	12.000	6.150	9.850	.
1991 SEP	BDL	11.900	7.400	11.300	.
1991 NOV	BDL	10.500	10.550	10.100	.
1992 JAN	BDL	10.300	.	7.600	.
1992 APR	BDL	11.550	.	7.250	.
1992 JUL	BDL	13.500	.	12.800	.
1992 OCT	BDL	11.200	.	11.600	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) USS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
VOLATILES					
112-TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 0.6 (D4)	
36 SAMPLES	BOL	BOL	BOL	BOL	BOL
CHLOROIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)	
1991 JAN	BOL	4,300	1,900	-	3,400
1991 MAR	BOL	3,800	1,900	-	3,200
1991 MAY	BOL	4,500	3,200	-	4,100
1991 JUL	BOL	5,200	3,200	-	4,800
1991 SEP	BOL	5,400	4,200	-	5,500
1991 NOV	BOL	4,900	4,800	-	5,100
1992 JAN	BOL	5,400	-	-	4,500
1992 APR	BOL	5,900	-	-	4,300
1992 JUL	BOL	7,700	-	-	7,500
1992 OCT	BOL	6,800	-	-	6,800
TETRACHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 65 (A5)	
36 SAMPLES	BOL	BOL	BOL	BOL	BOL
BROMOFORM (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 350 (A1+)	
1991 JAN	BOL	BOL	BOL	-	.400 <T
1991 MAR	BOL	.400 <T	.200 <T	-	.200 <T
1991 MAY	BOL	.600 <T	.400 <T	-	.400 <T
1991 JUL	BOL	BOL	BOL	-	BOL
1991 SEP	BOL	.400 <T	BOL	-	.400 <T
1991 NOV	BOL	.600 <T	.400 <T	-	.600 <T
1992 JAN	BOL	BOL	-	-	BOL
1992 APR	BOL	BOL	-	-	BOL
1992 JUL	BOL	.800 <T	-	-	1,000 <T
1992 OCT	BOL	.800 <T	-	-	.800 <T
1122-TETRACHLOROETHANE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 0.17 (D4)	
36 SAMPLES	BOL	BOL	BOL	BOL	BOL
VINYL CHLORIDE (UG/L)		DET'N LIMIT = 0.100		GUIDELINE = 2 (D1)	
9 SAMPLES	BOL	-	-	-	BOL
C12-DICHLOROETHYLENE (UG/L)		DET'N LIMIT = 0.100		GUIDELINE = 70 (D1)	
9 SAMPLES	BOL	-	-	-	BOL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
VOLATILES					
CHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 1510 (03)	
36 SAMPLES	BDL	BDL		BDL	
1,4-DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 5 (A1)	
36 SAMPLES	BDL	BDL		BDL	
1,3-DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 3750 (03)	
36 SAMPLES	BDL	BDL		BDL	
1,2-DICHLOROBENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 200 (A1)	
36 SAMPLES	BDL	BDL		BDL	
ETHYLENE DIBROMIDE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50 (01)	
36 SAMPLES	BDL	BDL		BDL	
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)	
1991 JAN	BDL	8.200		17.050	
1991 MAR	BDL	10.000		18.150	
1991 MAY	BDL	25.100		24.700	
1991 JUL	BDL	40.000		29.650	
1991 SEP	BDL	44.300		37.300	
1991 NOV	BDL	22.300		30.400	
1992 JAN	BDL	33.600		20.700	
1992 APR	BDL	28.300		20.250	
1992 JUL	BDL	33.050		36.600	
1992 OCT	BDL	32.600		34.000	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 ST THOMAS (ELGIN) WSS

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	DIST. SYSTEM R R 1 UNION FREE FLOW	DIST. SYSTEM R R 1 UNION STANDING	DIST. SYSTEM RAVEN AVE FREE FLOW	DIST. SYSTEM RAVEN AVE STANDING
RADIONUCLIDES					
COBALT 60 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = N/A	
8 SAMPLES	BDL				
CESIUM 134 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = N/A	
8 SAMPLES	BDL				
CESIUM 137 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = 50 (A1)	
8 SAMPLES	BDL				
GROSS ALPHA COUNT (BQ/L)		DET'N LIMIT = 0.04		GUIDELINE = 0.55 (D1)	
1991 JUL	BDL				
1991 NOV	.230				
1992 JAN	.090				
1992 JUL	BDL				
GROSS BETA COUNT (BQ/L)		DET'N LIMIT = 0.04		GUIDELINE = N/A	
1991 JUL	BDL				
1991 NOV	.100				
1992 JAN	.090				
1992 JUL	.090				
TRITIUM (BQ/L)		DET'N LIMIT = 7.00		GUIDELINE = 40000 (A1)	
1991 JUL	BDL				
1991 NOV	BDL				
1992 JAN	9.000				
1992 JUL	BDL				
IODINE 131 (BQ/L)		DET'N LIMIT = 0.70		GUIDELINE = 10 (A1)	
8 SAMPLES	BDL				

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A4)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY.	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.20	30-500 (A4)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.20	100.0 (F2)
CHLORIDE	MG/L	0.20	250.0 (A3)
COLOUR	TCU	0.50	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.00	400.0 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.10	5.0 (A3)
FLUORIDE	MG/L	0.01	1.5* (A1)
HARDNESS	MG/L	0.50	80-100 (A4)
IONCAL	DMNSLESS	N/A	N/A
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.10	30.0 (F2)
NITRATES (TOTAL)	MG/L	0.005	10.0 (A1)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
POTASSIUM	MG/L	0.010	10.0 (F2)
RESIDUE FILTRATE (CALCULATED TDS)	MG/L	N/A	500.0 (A3)
SODIUM	MG/L	0.20	200.0 (A4)
SULPHATE	MG/L	0.20	500.0 (A4)
TURBIDITY	FTU	0.05	1.0 (A1)

* The Maximum Acceptable Concentration (MAC) for naturally occurring fluoride in drinking water is 2.4 mg/L.

CHLOROAROMATICS

1,2,3-TRICHLOROBENZENE	NG/L	5.0	N/A
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,4-TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.0	N/A
2,3,6-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,6A-TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE (HCB)	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)

CHLOROPHENOLS

2,3,4-TRICHLOROPHENOL	NG/L	100.0	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	20.0	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
2,4,5-TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	N/A
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
POLYNUCLEAR AROMATIC HYDROCARBONS			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DESETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADAX)	NG/L	100.0	10000 (A2)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	30000 (A1)
O,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDE	NG/L	1.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
DESETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	N/A
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.0	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.0	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.0	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.0	N/A
2,4,5-TP (SILVEX)	NG/L	20.0	10000 (A1)
BUTYLATE (SUTAN)	NG/L	2000.0	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.0	90000 (A1)
CARBOFURAN	NG/L	2000.0	90000 (A1)
CHLORPROPHAM (CIPC)	NG/L	2000.0	350000 (G)
CHLORPYRIFOS (DURSBAN)	NG/L	20.0	N/A
DIALLATE	NG/L	2000.0	N/A
DIAZINON	NG/L	20.0	20000 (A1)
DICAMBA	NG/L	50.0	120000 (A1)
DICHLOROVOS	NG/L	20.0	N/A
EPTAM	NG/L	2000.0	N/A
ETHION	NG/L	20.0	35000 (G)
IPC	NG/L	2000.0	N/A
MALATHION	NG/L	20.0	190000 (A1)
METHYL PARATHION	NG/L	50.0	9000 (D3)
METHYLTRITHION	NG/L	20.0	N/A
MEVINPHOS	NG/L	20.0	N/A
PARATHION	NG/L	20.0	50000 (A1)
PHORATE (THIMET)	NG/L	20.0	2000 (A2)
PICHLORAM	NG/L	100.0	190000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.0	140000 (D3)
RELDAN	NG/L	20.0	N/A
RONNEL	NG/L	20.0	N/A
VOLATILES			
1,1-DICHLOROETHANE	UG/L	0.10	N/A
1,1-DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2-DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2-DICHLOROETHANE	UG/L	0.05	5 (A1)
1,2-DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3-DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4-DICHLOROBENZENE	UG/L	0.10	5 (A1)
1,1,1-TRICHLOROETHANE	UG/L	0.02	200 (D1)
1,1,2-TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1,1,2,2-TETRACHLOROETHANE	UG/L	0.05	0.17 (D4)

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORO Dibromomethane	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
CIS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	65 (A5)
TRANS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)
VINYL CHLORIDE	UG/L	0.10	2 (D1)
RADIONUCLIDES			
TRITIUM	BQ/L	7.0	40000 (A1)
GROSS ALPHA COUNT	BQ/L	0.04	0.55# (D1)
GROSS BETA COUNT	BQ/L	0.04	N/A
COBALT 60	BQ/L	0.70	N/A
CESIUM 134	BQ/L	0.70	N/A
CESIUM 137	BQ/L	0.70	50 (A1)
IODINE 131	BQ/L	0.70	10 (A1)

Equal to 15.0 Picocuries/litre

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1992, 109 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment and Energy (MOEE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOEE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOEE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOEE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOEE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOEE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOEE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

PARAMETER REFERENCE INFORMATION

NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 $\mu g/L$

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27)
CYCLOHEXATRIENE (41)

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NONPOLAR LIQUID, OF
HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN
WITH SMOKING FLAME (30)

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41)
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS
AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT
A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES,
SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM
SOILS OR ARE DEGRADED RATHER QUICKLY (80)

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR
DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES;
COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER
COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND
RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING
AGENT; GASOLINE.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING
BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION
WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION,
COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION,
OXIDATION

ADDITIONAL PROPERTIES: MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27)
BOILING POINT: 80.1°C (27)
SPECIFIC GRAVITY: 0.8790 AT 20°C (27)
VAPOUR PRESSURE: 100 MM AT 26.1°C (27)
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41)
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39)
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	<ul style="list-style-type: none"> -220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	<ul style="list-style-type: none"> -45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI)	<ul style="list-style-type: none"> -1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Specific Pesticides (OWCP), (PEOP), (PECAR)	<ul style="list-style-type: none"> -as per Organics -three extra bottles must be filled
Polyaromatic hydrocarbons (OAPAHX)	<ul style="list-style-type: none"> -1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate
Cyanide (Treated only)	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	<ul style="list-style-type: none"> -250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)

Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year) (PBVOL), (PBEXT)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.
6. No smoking in area of sample location.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.

5. Fill general chemistry and metals bottles.

6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (Caution: HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Polyaromatic Hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate

Steps:

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

